

Cyanobacteria and Their Toxins

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Harmful algal blooms (HAB) of cyanobacteria, also known as blue-green algae, have recently become more spatially and temporally prevalent in the U.S. and worldwide. Cyanobacteria and their highly potent toxins are a significant hazard for human health and the ecosystem in drinking water, recreational water, and aquaculture. Currently, the U.S. has no guidelines or regulations on cyanobacteria or cyanotoxins. Cyanobacteria and their toxins are on the Agency's Unregulated Contaminant Monitoring Regulation List 3 (UCMR) and the Contaminant Candidate List (CCL). The Office of Water (OW) is unable to promulgate regulations or produce guidelines at this time due to the lack of sensitive, specific, and field-ready analytical methods, data on the occurrence of cyanobacterial HABs, proven prevention and mitigation technologies, and human-health risk estimates.

To date, the OW has assembled an interactive database of more than 3,000 scientific articles on cyanobacteria and produced documents on the state of science on cyanobacteria and their toxins plus a summary for cyanotoxins in drinking water. ORD scientists are reviewing the literature on cyanobacterial toxicology, identifying data needed to assess the risk of exposure to four cyanotoxins, and assessing the plausibility of modeling quantitative structural-activity relationships (QSARs) for cyanotoxins. A number of scientists are refining analytical methods to detect selected cyanotoxins in water to support the OW/UCMR monitoring study. Several investigators have assessed the efficacy of cyanobacteria removal and cyanotoxin destruction by conventional water treatment processes and are currently exploring advanced oxidation technologies and sonolysis to inactivate and/or destroy cyanotoxins in water. The behavioral and developmental effects of cyanotoxins are being studied. The feasibility of an epidemiologic study on the health effects of repeated, low-level exposure to cyanotoxins in drinking water is being assessed. These tasks are being carried out through collaborations within the Agency and with academia and stakeholders.

The National Center for Environmental Research (NCER) is supporting cyanobacterial research by funding five research grants, two student fellowships, and two small business initiatives. Research studies include the development of microarrays to detect cyanobacteria and cyanotoxins and the relationships between nutrient loading and cyanobacterial dominance.

The ORD will sponsor an international symposium on cyanobacteria in September, 2005. Invited speakers and workgroup members will identify and prioritize cyanobacteria research needs. The

products of this symposium will enable ORD management to assess the need for an integrated research program on cyanobacteria to support source water protection programs and CCL decisions.

This abstract does not necessarily reflect U.S. EPA policy.